From:	Fortenberry, Chase
To:	Saric, James; Wood, Nicole
Cc:	BUCHOLTZP@michigan.gov; wagonerr1@michigan.gov; Davis, Michael (GP Law); Lathrop, Alison J. (GP LAW); Griffith, Garry T.; Massengill, Dave G.; Garret Bondy
Subject:	AMEC - Quality Management Plan Submittal
Date:	Friday, March 29, 2013 2:51:25 PM
Attachments:	GP QMP 3.29.13.pdf

Jim,

As stated in Georgia-Pacific's correspondence to you on March 22, 2013, Georgia-Pacific has engaged AMEC Environment and Infrastructure, Inc. as its new primary environmental consultant to complete the SRI/FS requirements in the AOC. Pursuant to paragraph 27.a. of the AOC, Georgia-Pacific is submitting a copy of AMEC's Quality Management Plan to US EPA Region 5.

Should you have any question or require additional information regarding these changes, please contact me at (404) 652-6166.

Sincerely,

L. Chase Fortenberry, P.G.
Manager - Environmental Engineering
Georgia-Pacific LLC
133 Peachtree St., NE
Atlanta, GA 30303
Office #: (404) 652-6166
Mobile #: (404) 539-3509
lcforten@gapac.com

QUALITY MANAGEMENT PLAN

Allied Paper/Portage Creek/Kalamazoo River, Superfund Site

Submitted to:

Georgia-Pacific, L.L.C.

Submitted by:

AMEC Environment and Infrastructure, Inc.

Novi, Michigan

March 2013

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DEFINITIONS

ARCHIVE - A place in which records are preserved.

AMEC QA MANUAL - Consists of the AMEC QA Plan and the AMEC QA Procedures.

AMEC QUALITY POLICY - Provides guidance for development and implementation of the AMEC QA Program.

AMEC QA PLAN - Provides quality requirements and guidance to all elements of the organization.

AMEC QA PROCEDURES - Identify controls and provide implementing instructions for activities that are common to all organizational elements.

AUDIT - A planned and documented activity performed to determine by investigation, examination, or evaluation of objective evidence the adequacy of and compliance with established procedures, instructions, drawings, other applicable documents, and good business practices and the effectiveness of their implementation. An audit should not be confused with surveillance or inspection activities performed for the sole purpose of process control or product acceptance.

AUDIT FINDING - Departure from approved procedures, program requirements, other applicable documents, or good business practices that have, or in the immediate future could reasonably be expected to have, an adverse effect on the adequacy or effective implementation of the AMEC QA program.

AUDIT WEAKNESS - Departure from approved procedures, program requirements, other applicable documents, or good management practices that, if not corrected in a timely manner, could reasonably be expected to have a future adverse effect on the adequacy or effective implementation of the AMEC QA program.

AUDITOR - Any individual who performs or assists in the performance of any part of an audit, including technical specialists and others such as management representatives and auditors-in-training.

CONTROLLING DOCUMENT - A document such as a drawing, procedure, or specification that defines the requirements or the method for performing activities affecting the quality of products and services.

DATA FILE - In electronic records, an organized collection of data, usually arranged in logical records, which are stored together and tracked as a unit by a computer.

DISCIPLINE - For purposes of identifying responsibilities within the QA Program, this term represents a major business category that may encompass a relatively unique set of requirements. Examples of disciplines include the areas of responsibility under the Technical Specialist.

DOCUMENT - Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results. A document becomes a record by definition of the project manager or upon review and authentication in accordance with the requirements of this procedure.

FILE - A collection of records or non-record material arranged according to a plan.

LEAD AUDITOR - An individual who is qualified to organize and direct an audit, report audit findings, and evaluate proposed corrective action.

PROJECT - For purposes of the description of the QA Program, this term represents a contract, program, project, or task order; recognizing that there may be several tiers within a "project."

PROJECT FILE - A collection of all documents pertaining to a project that may be considered as records.

PROJECT MANAGER - For purposes of the description of the QA Program, this term represents the individual who is responsible for managing the activities that constitute a project as defined herein.

QUALITY - The degree to which an item, process, or service meets or exceeds client requirements and expectations.

QUALITY ASSURANCE - Planned and systematic actions that provide confidence that quality is achieved and that items, processes, or services will perform satisfactorily when used.

QUALITY CONTROL – The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality.

RECORDS - Books, papers, maps, photographs, machine-readable electronic files, or other documentary materials, regardless of physical form or characteristics, appropriate for preservation as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the organization.

1.0 INTRODUCTION

AMEC Environment & Infrastructure, Inc. (AMEC) is a multi-discipline engineering and environmental consulting firm. It is the policy of AMEC to provide services and products that will achieve customer expectations for reliability, effectiveness, and conformance with applicable requirements. This document integrates specific information and applicable requirements from AMEC's corporate-level Quality Management Plan (QMP) into this project QMP prepared for the Allied Paper Superfund Site at Portage Creek and Kalamazoo River in Michigan. This project QMP establishes the quality assurance (QA) requirements, QA responsibilities, and documents the quality system that will be implemented by AMEC during the performance of environmental investigations and feasibility studies.

1.1 The AMEC Quality Management Plan, EPA Quality System Requirements and ANSI/ASQ E4-1994

The AMEC QMP is based on the ANSI/ASQC E4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data and Environmental Technology Programs" and EPA QA/R-2, "EPA Requirements for Quality Management Plans". The ANSI/ASQC E4-1994 standard describes the necessary management and technical elements for developing and implementing a quality system. The standard recommends first documenting the quality system in a QMP (to address requirements of *Part A: Management Systems* of the standard) and then documenting the applicability of the quality system to technical activity-specific efforts in a Quality Assurance Project Plan (QAPP) or similar document (to address the requirements of *Part B: Collection and Evaluation of Environmental Data* of the standard). EPA has adopted this tiered approach for its mandatory Agency-wide Quality System. This document addresses Part A requirements of the standard. AMEC will prepare QAPPs as separate documents to describe the collection and evaluation of environmental data in support of this project.

2.0 MANAGEMENT SYSTEMS (PART A)

This QMP addresses the requirements of *Part A: Management Systems* of the ANSI/ASQC E4-1994 standard by documenting management practices and providing the framework through which appropriate management controls are developed and implemented to ensure that products and services meet or exceed specific program requirements imposed on AMEC activities by law, contract, or management directive.

As described in EPA QA/R-2, the following sections of this document will describe key elements of this QMP:

- Management and Organization – AMEC will present our management structure, with well-defined roles within the project and clear lines of communication. AMEC will implement a planning process to determine that data necessary to support project decisions and regulatory actions will be collected. Data Quality Objectives (DQOs) will be established to ensure that data are defensible for their intended purposes.

- Quality Systems – AMEC will use a variety of quality systems tools including planning, review, documentation, audits, training, data verification, data validation, and data assessment. Project-specific Quality Assurance Project Plans (QAPPs) will be developed in accordance with EPA Requirements for QA Project Plans (EPA QA/R5). EPA/240R/B1/003. All data generated will be of known and documented quality. Data that fail to meet quality objectives will not be used.

- Personnel Qualifications and Training – AMEC will make available appropriate staff and document training.

- Services Procurement – AMEC will establish proficiency demonstration benchmarks for subcontractors and laboratories. AMEC will monitor performance of subcontractors and laboratories on an ongoing basis.

- Documentation and Records – AMEC will employ document control and record management systems.

- Computer Hardware and Software – AMEC will secure hardware and software to meet project requirements and implement archival procedures.

- Implementation of Work Processes – AMEC will execute procedures to ensure work is performed according to the QMP, QAPPs, SOPs, and any other applicable requirements.

- Assessment and Response – AMEC will assess the project quality system through audits, reviews, and evaluations. Any deficiencies noted will be promptly addressed through corrective actions.

- Quality Improvement – AMEC will define roles and responsibilities for identifying and correcting any adverse conditions in the project quality system.

2.1 MANAGEMENT AND ORGANIZATION

AMEC is a professional organization that provides quality environmental and engineering services and products to a global Client base. AMEC provides a broad range of technical services that includes but is not limited to environmental remediation, environmental science, civil engineering, structural engineering, geotechnical engineering, materials engineering, hydrogeology, water resources, information management, mechanical/electrical/plumbing engineering, process design, construction and construction management services.

AMEC has established a Quality Policy as a foundation for how our staff executes work and deliver high quality work products to our clients. Our management structure provides the necessary authority from our company president through all staff to assure that corporate and project-specific procedures and plans are followed. This QMP provides the framework for project delivery.

2.1.1 AMEC's Corporate Quality Policy

This project QMP incorporates AMEC's corporate Quality Policy as issued by our company president:

AMEC Environment & Infrastructure Americas (AEIA) is a global multi-discipline engineering and environmental consulting firm. We are committed to providing quality products and services that meet our client, regulatory, and internal requirements and we strive to exceed Client expectations. In line with AMEC plc, AEIA's parent company, we recognize the Quality Management Principles, as presented in the ISO 9000 series of Quality Management Standards, as a means of business performance and improvement. We are committed to continually improving our products and services through an effective Quality Management Program (QMP).

The QMP, at its highest level, consists of a Quality Management Program Manual that is aligned with the requirements of the ISO 9001 standard. High-level Implementing Procedures, based on AMEC plc policies and procedures that apply, are used across market Sectors and organizational schemes. These procedures are implemented across the spectrum of the AEIA business for project delivery unless a modification is authorized.

QMP flexibility is provided through supplemental sets of Manuals and/or Implementing Procedures developed to accommodate client and/or regulatory specific quality requirements. The QMP provides the flexibility to establish supplemental quality procedures and/or programs at the operational level for compliance with programs such as Nuclear NQA-1, ISO 14001, EPA QA/R-2, etc.

It is essential that this policy, our objectives, and the QMP be communicated to a degree that allows them to be understood and verifiable by clients, employees, and third parties. Specific quality management objectives are established on an annual basis, measured, monitored, and communicated to affected parties.

The QMP is reviewed at periodic intervals to assure its continuing suitability, adequacy, and effectiveness. The review addresses the requirements of this policy and related quality objectives and requirements identified for AEIA, geographic, program or project level, and client needs. Revisions are made to the QMP as required to reflect the results of the reviews.

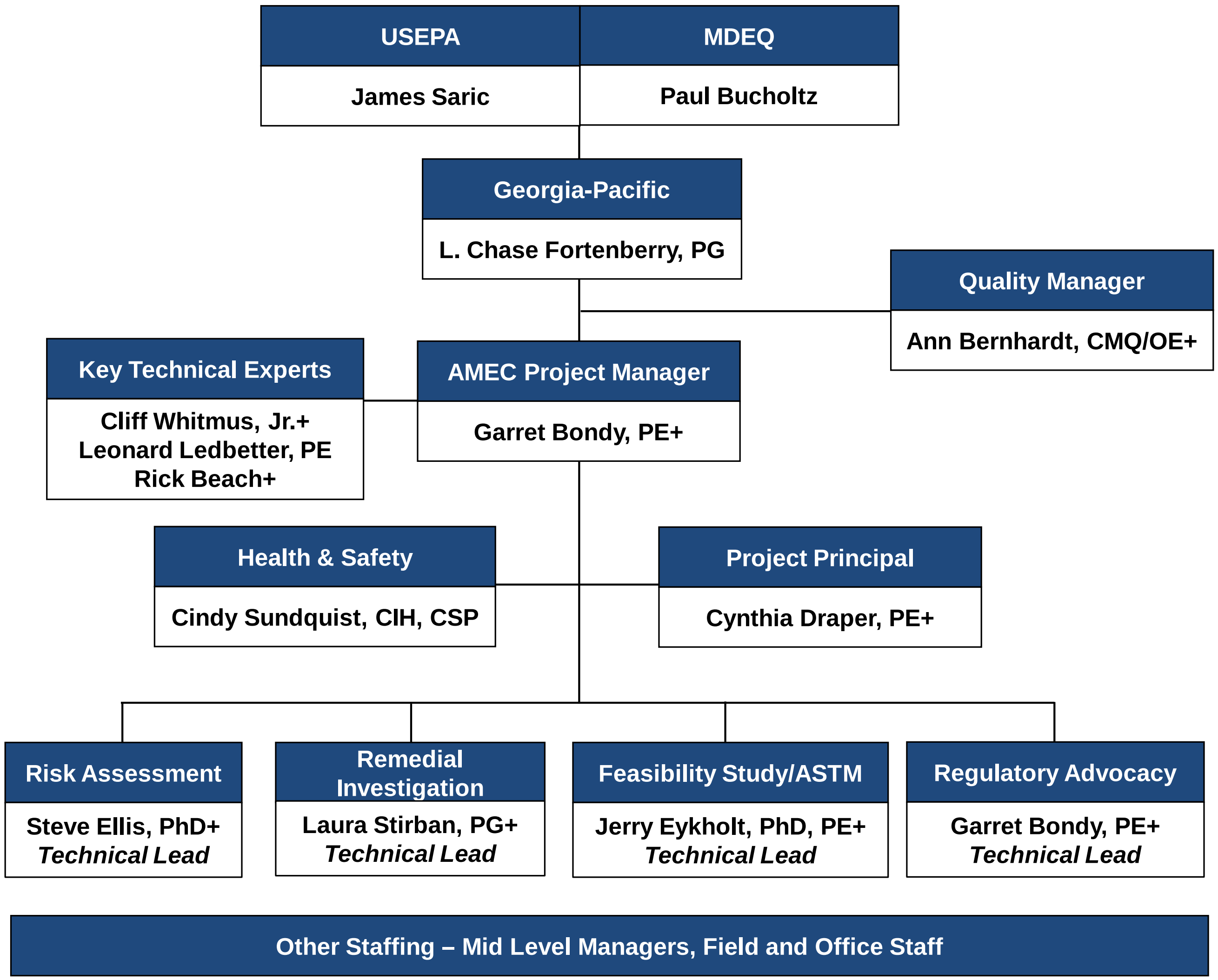
The President appoints a QMP Director who is responsible for the overall quality program. The President also appoints a Director of Quality Assurance who reports to the QMP Director and works with the Senior Management Team to develop and implement the Quality Management Program. The Senior Management Team is responsible for implementation and assuring that staff understand and fulfill the requirements. The Director of Quality Assurance is responsible for assessment and verification of the implementation."

2.1.2 Company Organization and Responsibilities

Figure 1 presents the project Organizational Chart. Roles and responsibilities of AMEC staff related to quality are presented below. Although all corporate positions are not presented on the project Organizational Chart, there is direct reporting from the Project Quality Manager to the Corporate Director of Quality Assurance, who reports directly to AMEC's President. Project-level resumes are included in Appendix I.

AMEC President – Mr. Tom Logan, is responsible for the overall quality of services provided by AMEC.

Figure 1
Organizational Chart



\+ Resumes Included

Corporate QMP Director – reports directly to the President for matters involving quality and provides overall direction for AMEC's Corporate QMP. Mr. Don Chandler is AMEC's Corporate QMP Director.

Director of Quality Assurance – reports to the Corporate QMP Director and is responsible for the development of the framework of the QMP and supports the implementation and assessment of the QMP. Mr. Charlie Greer is AMEC's Director of Quality Assurance.

Below is a project organizational chart. Resumes for key individuals are included in Appendix I.

Project Manager – is responsible for all aspects of project execution and quality achievement in the delivery of services for projects assigned to him. Mr. Garret Bondy is the Project Manager. Additional responsibilities include:

- Assuring that projects are properly staffed and for establishing appropriate budgets and schedules, making available appropriate forms of training and monitoring the performance of staff.
- Review and approve SOPs.
- Support the efforts of the QA Director in matters concerning the quality of work products.
- Assure effective response to corrective action requirements identified by members of the project team.
- Review reports and other deliverables.
- Maintain and track project schedule and budget.
- Coordinate preparation of required plans, proposals, and reports.

Project Principal – works with the Project Manager to provide the necessary resources to meet client needs. Ms. Cynthia Draper will serve as Project Principal and will have final accountability for AMEC's performance to Georgia-Pacific and the EPA.

Project Staff – are responsible for the execution of projects and the achievement of the required quality under the direction of the Project Manager. Project Staff are responsible for the following:

- Accepting full responsibility for the quality of their work.
- Reviewing assignments to assure they have a clear understanding of assigned tasks, client requirements, and applicable quality requirements.
- Requesting clarification of requirements and additional training if deemed necessary.
- Performing at their full potential and assisting management by identifying possible changes in procedures, processes, or methods that will result in improved products or services.
- Assisting management in the early identification of conditions that may hamper or prevent fulfillment of QA requirements in a timely manner, and assisting in the resolution of such conditions.

Project Quality Manager – is responsible for supporting the Director of Quality Assurance in the assessment and verification of the implementation of the QMP. The Project Quality Manager is assigned the responsibility to oversee quality across the Allied Paper/Portage Creek/Kalamazoo River, Superfund Site project. The Project Quality Manager is Ms. Ann Bernhardt. The Project Quality Manager has independent authority, equal to that of the Project Manager, to take actions necessary to verify the reliability and validity of work and deliverables according to project QAPPs and related project documents. The Project Quality Manager has approval and authority to stop work should QA related concerns arise, and ability to raise QA concerns to higher levels of management for resolution, if necessary. The Project Quality Manager will review the quality of data being generated to ensure consistency with project data quality objectives and perform audits of the data collection system; including planning, data validation, field and laboratory operations.

Specific responsibilities include:

- Verify that appropriate QC measures are being carried out and documented.
- Conduct periodic performance audits and/or surveillances to measure conformance specification.
- Ensure records related to QC are documented and maintained securely and retrievably. Prepare periodic quality reports and QA sections of final reports.
- Ensure corrective actions are carried out and documented in a way that precludes future occurrences.
- Review and approve SOPs and training records.
- Review data validation reports and subsequent data assessment.

2.2 QUALITY SYSTEM AND DESCRIPTION

This QMP describes the structure of the AMEC Quality Assurance Program and establishes the responsibilities and methodology used to determine and document the degree to which specific program elements will be applied to activities performed by AMEC. The second tier of AMEC's Quality System is the project-level information, detailed in QAPPs and Work Plans.

The QMP is developed and maintained under the guidance of the AMEC Corporate Director of Quality Assurance. AMEC's quality system is reviewed annually to incorporate updates and changes in the organization and policy.

2.2.1 Quality System Documentation

The AMEC Quality System documentation consists of the following:

- AMEC Quality Policy
- Quality Management Plan
- Quality Assurance Procedures
- Discipline-Specific Procedures
- Project-Specific Quality Assurance Project Plans
- Project-Specific Work Plans
- Project-Specific Procedures

<u>AMEC Quality Policy</u>
The AMEC Quality Policy is a corporate policy statement that defines quality objectives for AMEC work. The AMEC President leads the development of the AMEC Quality Policy that forms the basis for the QA Program.

<u>QMP and QA Procedures</u>
The QMP provides the corporate level framework through which appropriate management controls are developed and implemented to ensure that quality objectives are met. AMEC Quality Assurance Procedures identify corporate-level controls and provide instructions for implementation of activities common to all organizational elements.

The AMEC QMP and associated QA Procedures are prepared and maintained by the Directory of Quality Assurance and approved by the AMEC President.

Project-Specific Quality Assurance Project Plans

Project staff will prepare project-specific QAPPs under the direction of the Project Quality Manager who has final responsibility for the contents of the documents. Document preparation, implementation, and assessment are often collaborative efforts between specialists, assistants, and support staff. The Project Quality Manager will have overall responsibility and final review and approval for QA/QC documentation and may delegate specific tasks and assign roles to complete assignments.

The QAPPs are based on the specific requirements of individual projects. For environmental programs, QAPPs are prepared in accordance with EPA Requirements for QA Project Plans, EPA QA/R-5, EPA/240/B-01/003 March 2001. The project-specific QAPPs describe QA/QC procedures to be followed for specific activities as described in the associated work plan. The project-specific QAPP presents detail regarding project management, data generation and acquisition, assessment and oversight, and data validation and usability. The project-specific QAPPs present the organization, objectives, planned activities, and specific protocols for the associated scope of work, sampling and analysis, sample handling and storage, chain-of-custody, laboratory analyses, and field measurements being conducted under the associated work plan.

Project-Specific Work Plans

The purpose of each project-specific work plan is to present and describe each task for a particular program. For each task the work plan will list the sample rationale, frequency, and procedures for sampling; identify laboratory analytical methods; identify field and laboratory QA/QC procedures; describe data analysis procedures; and document the report contents and structure that will be used to present the data gathered during the field event.

Project-Specific Procedures

Project Managers identify the QA requirements (such as may be contained in the contract, task order, or related documents) applicable to the projects for which they are responsible.

The Project Manager and Project Quality Manager evaluate the existing QA procedures and discipline-specific procedures to determine if they provide adequate controls to satisfy the identified requirements. If adequate controls are not included in the QA procedures or discipline-specific procedures, the Project Manager coordinates with the Project Quality Manager to develop project-specific procedures that will be documented in Work Plans or QAPPs.

2.3 PERSONNEL QUALIFICATION AND TRAINING

This section defines qualifications and training requirements and guidance for AMEC personnel to ensure familiarity with the requirements of the processes or activities they perform. Training varies according to task and is conducted to enhance compliance with the approved technical procedures required to perform the task.

Managers and supervisors are responsible for ensuring that employees under their supervision maintain proficiency, expertise, and knowledge in their respective work disciplines. It is also their responsibility to ensure that their personnel are adequately trained in applicable policies, procedures, requirements, and their scope of application.

Training plans shall not be limited to attainment of initial qualifications, but shall provide for progressive improvement. Training may consist of on-the-job training, self-accomplished reading assignments, seminars, and/or presentations by qualified instructors. Education, technical knowledge, and experience may be substituted in lieu of training in certain functions.

Required training shall be conducted and documented to provide reasonable assurance that personnel understand the fundamentals of the processes or activities they perform and the requirements and regulations associated with those processes or activities.

Training course information, including completion date, will be provided to the Project Quality Manager or designee for records retention. All training documentation will be signed off by the individual receiving training. Persons verifying activities (such as auditors or personnel conducting surveillance) shall be familiar with the principles, techniques, and requirements of the activity being performed.

At a minimum, the training and development needs of each employee are evaluated during their annual Performance and Development Review and training goals are established.

2.4 PROCUREMENT OF ITEMS AND SERVICES

2.4.1 Procurement Planning

Procurement planning is the process that facilitates procurement of needed supplies and services in a timely manner and at a fair and reasonable price. Such planning allows for efficient and effective use of AMEC resources and improves the opportunity to obtain the best value at the best price.

The AMEC Subcontract Administrator will perform adequate acquisition planning consistent with the character and risks associated with procurement of each requirement prior to issuing solicitations. The planning should address the adequacy of the requirement description and specification, the market availability of the requirement, the practicality of the schedule or delivery of the requirement, technical and/or performance risks, funding limitations, and the planned strategy to mitigate the risks and constraints identified.

Procurement planning is a team effort and should involve technical, contractual, program management, and client personnel all focused on developing the most effective plan for delivery of quality supplies or services in the most economical and timely manner possible.

Whenever possible, it is the policy of AMEC to use in-house capabilities to satisfy contractual requirements due to the increased ability to exercise control over the work. However, there may be a compelling reason for AMEC to subcontract a portion of the effort due to cost, schedule, technical, or contractual constraints.

All procurement activities by AMEC are conducted in accordance with the highest standards of business ethics in order to build good client, community, and business relations, while accomplishing the objectives of quality, timeliness, and cost competitiveness. Procurement activities provide for reasonable competition among responsible suppliers, compatible with needs, quality, quantity, delivery, services required, and applicable laws or regulations.

The purchase requisition (PR) is a multi-purpose form that provides necessary information and authorization for the Subcontract Administrator to proceed with a procurement. The form (Appendix II), is integrated into a company intranet web-based procurement process, and authorizes the expenditure of AMEC funds.

A PR for services or non-standard supplies must contain a clear and concise SOW or specification or drawing to enable all prospective offerors to compete on an equal basis. It must be sufficiently detailed so that parties to a resultant subcontract clearly understand their obligations and responsibilities. Some flexibility in the SOW may be desired, but the performance requirements must be clear and concise to avoid ambiguity that may lead to contingencies, assumptions, price increases, claims, disputes, and scope changes. AMEC will specify quality requirements necessary for subcontractors to achieve in a statement of work. The subcontractor or vendor must meet quality requirements for payment.

2.4.2 Procurement Documentation

Selection of the appropriate procurement document and the development of the proposed scope of work are related and should be considered concurrently. The type of subcontract used is determined by the degree of risk in contract performance. When risk is minimal or can be predicted with an acceptable degree of certainty, a firm-fixed-price type subcontract should be used. As subcontract performance uncertainties become more significant, other fixed-price or cost-reimbursement type subcontracts should be used to accommodate those uncertainties.

2.4.3 Procurement Review

The AMEC Subcontract Administrator is responsible for reviewing and ensuring that all actions taken in connection with the solicitation and award of a subcontract are properly documented prior to issuing a subcontract. The procurement file includes a section on award documentation to include all original documentation generated prior to award of the subcontract.

Supplier responsibility shall be determined considering the following:

- Offers received in response to the solicitation and statement of work, where applicable
- Cost or pricing data submitted by the Supplier
- Advance notice of intent to award a subcontract provided to the contracting officer
- Consent to award subcontract (if applicable)
- Subcontractor Small and Small Disadvantaged Business Subcontracting Plan (if applicable)
- Data relevant to royalties, patents, or copyrights
- Payment and Performance Bonds
- Insurance certificates
- Negotiation memoranda
- Notice and debriefing of unsuccessful offerors
- All other documentation or information that is related to pre-award activity
- Source selection by evaluation criteria
- Completed representations and certifications (as applicable)

- Equal Employment Opportunity (EEO) pre-award clearance

Once all of the above actions to properly document and/or support an award have been completed, a subcontract is issued to the supplier. A subcontract will generally be issued for the following services:

- Drilling
- Surveying
- Laboratory Analyses
- Hazardous Waste Transport and/or Disposal
- Construction
- Remediation

Generally, two originals of the award document are to be forwarded to the supplier unsigned by AMEC with a transmittal letter requesting that both copies be signed and returned to AMEC and that a certificate of insurance be sent to AMEC prior to commencing performance. The award document is to be signed in accordance with the company Limits of Authority policy. One original is returned to the supplier, while the other is maintained in the subcontract file.

2.4.4 Procurement of Laboratory Services

AMEC prepares a Statement of Work (SOW) as part of laboratory procurement. The SOW details the analytical scope of work and associated QA/QC requirements, project action limits, deliverables, turn-around-time, prior experience, and references. Laboratories must meet specific benchmarks in order to provide analytical services. These items include:

- A comprehensive laboratory-specific QA Manual that meets the requirements of the current NELAC standards and/or ISO/IEC Guide 17025
- Current state and NELAC audit and certifications
- Acceptable results from most recent Performance Evaluation (PE) samples results for contaminants of concern.
- Laboratory control charts produced over the past six months for contaminants of concern that demonstrate accuracy and precision meeting project DQOs.
- Laboratory method detection limit studies demonstrating sensitivities for contaminants of concern at or below project requirements.

2.5 DOCUMENTS AND RECORDS

2.5.1 Document and Records Control

Activities affecting the quality of products and services provided by AMEC are prescribed by, and performed in accordance with, controlling documents (e.g., procedures, instructions, and drawings) appropriate to the circumstances. When applicable, these documents contain or reference acceptance criteria for determining that activities are satisfactorily completed. The extent and detail of controlling documents are commensurate with the degree of control required to achieve the required level of quality. Controlling documents are developed within an overall document hierarchy that provides for an orderly and consistent set of controls applicable to appropriate AMEC organizational elements and activities.

2.5.2 Documents

Controlling documents (e.g., procedures, instructions, and drawings) that prescribe the conduct of activities that affect the quality of products and services are controlled through the use of indices or lists and through the maintenance of master copies of the documents by those responsible for their preparation, issue, and revision. Appropriate controls are implemented to ensure that activities are conducted in accordance with current revisions of documents and that the use of superseded or obsolete controlled documents is precluded.

The preparation, review, approval, issue, and change process is described in detail, and the approval authority for each document is specified, in AMEC's Document Control Procedure which can be found in Appendix III.

All changes to documents are peer-reviewed by a person qualified to review specific changes and signed off by the reviewer. Any changes to the QAPP must be signed off the Project Quality Manager.

2.5.3 Records

Records are generated and retained to provide documentary evidence of the quality of the completed items or activities. Requirements for the generation, maintenance, and retention of records, including location, are specified in controlling documents (e.g., instructions, procedures, and drawings).

The record management system includes provisions for the identification of records by contract number and project name, methods for receipt control and status, methods for timely retrieval of records, and methods for timely turnover of records to the customer when required. Access to the records is controlled in accordance with applicable procedures.

Record Storage requirements are established in applicable procedures. In general, records are stored in a manner that minimizes the risk of loss by fire, flooding, theft, or the deterioration as a result of environmental conditions.

All project-specific records will be retained for 30 years per EPA Schedule 018 – *Sampling and Analytical Data Files – Superfund Site-Specific* (EPA, 2007). Hardcopy records will be digitally archived for ease of access. Archival records for the project will bestored and maintained at the AMEC Novi, Michigan office. Records include field logs, final deliverables, project communication, and contract information.

Archived project files may only be accessed by the Project Manager and Project Quality Manager.

2.6 PLANNING

2.6.1 Systematic Planning of Projects

The Project Manager and the Project Principal will work closely with Georgia-Pacific, EPA, and Michigan Department of Environmental Quality (MDEQ) to understand the project needs and expectations. The project team will use existing contracts, Administrative Order, and other documentation to define the work scope. Project planning documents will translate the work scope and project needs into sequenced tasks for proper execution. Details of how work will be performed and the specific quality requirements to follow will be captured in Work Plans, QAPPs, and potentially other documents.

Reviews of AMEC planning documents and other deliverables will be conducted at multiple levels to allow for incorporation of comments and achieve concurrence among stakeholders. Addressing the comments through formal response and negotiation may be required to incorporate client and stakeholder needs. Concurrence of stakeholders will demonstrate approval of the planning documents.

2.6.2 Data Quality Objectives

A systematic planning process shall be established, implemented, controlled, and documented for planning data collection activities. The use of a systematic project planning process results in data quality objectives (DQOs) which ensure that the right type, quality, and quantity of data are collected for the respective investigation. DQOs ensure that the proper data are collected and generated to answer environmental questions regarding a specific environmental problem. The systematic planning process also ensures that appropriate project decisions can be made.

Planning of environmental data operations will be accomplished in a manner consistent with the EPA Data Quality Objectives Process as described in EPA Guidance for the Data Quality Objectives Process (QA/G-4) (EPA 2006). DQOs describe the type, quantity and quality of data required to support the project study questions. DQOs may be developed for each stage of a program and should be specific towards the ultimate uses of the data and the level of certainty required.

The seven-step DQO process is iterative; the outputs from one step may influence prior steps and cause them to be redefined. This will ultimately lead to a more efficient data collection design. Each of the seven steps is described briefly and will be followed during task-specific DQO development.

- <u>Step 1, State the Problem:</u> Concisely describe the problem to be solved. Review prior studies and existing information to gain an acceptable understanding of the problem.
- <u>Step 2, Identify Goals of the Study:</u> Identify the key decisions that will be made to solve the problem.
- <u>Step 3, Identify Information Inputs:</u> Identify the information that needs to be learned and the measurements that need to be taken in order to make the decision.
- <u>Step 4, Define the Study Boundaries:</u> Specify the conditions (time periods and site boundaries) to which decisions will apply and within which the data should be collected.
- <u>Step 5, Develop the Analytic Approach:</u> Integrate the outputs from previous steps into an "if..., then..." statement that defines the conditions that would cause the decision maker to choose among alternative actions.
- <u>Step 6, Specify Performance or Acceptance Limits:</u> Define the decision maker's acceptable decision error rates based on a consideration of the consequences of making an incorrect decision.
- <u>Step 7, Develop Plan for Obtaining Data:</u> Evaluate information from the previous steps and generate alternative sampling designs. Choose the most resource-efficient design that meets all DQOs.

Once the DQOs have been identified, measurement performance criteria must be defined that will be necessary to achieve the overall quality objectives.

Measurement performance criteria are defined by the following parameters: precision, accuracy/bias, representativeness, completeness, comparability, and sensitivity/reporting limits. These parameters indicate the qualitative and quantitative degree of quality associated with measurement data and are referred to as data quality indicators (DQIs).

2.7 IMPLEMENTATION OF WORK PROCESSES

It is the policy of AMEC to provide services and products that achieve customer expectations for reliability, effectiveness, and conformance with applicable requirements. Work will be implemented according to approved planning documents. Compliance with planning document procedures and requirements will be assessed by the Project Manager, Project Quality Manager, and technical staff. All AMEC work products require internal review before release to a client. The review is required to verify compliance with the project objectives, that the scope was completed as tasked, that applicable regulatory requirements were met, and that the work product is of high quality.

2.7.1 Performance of Work

Activities affecting the quality of products and services provided by AMEC are prescribed by, and performed in accordance with, controlling documents (e.g., Work Plans, QAPPs, procedures, instructions, and drawings) appropriate to the circumstances. When applicable, these documents contain or reference acceptance criteria for determining that activities are satisfactorily completed. The extent and detail of controlling documents are commensurate with the degree of control required to achieve the required level of quality.

Special processes such as sample collection, laboratory analysis, data validation, and nondestructive examination are accomplished by qualified personnel, using qualified procedures and equipment, in accordance with applicable codes, standards, specifications, and other appropriate requirements. Records related to the qualification of personnel, equipment, and procedures, as appropriate, are established, maintained, and controlled. Records are maintained to demonstrate compliance with applicable procedures.

Inspections, tests, and document reviews are performed to verify that products have been produced or services have been provided in compliance with the established requirements.

Inspections are performed in accordance with the project-specific QAPPs to verify that specific quality requirements contained in controlling documents have been satisfied. Procedures for inspection or test activities include the acceptance and rejection criteria and, as applicable, the identification of required measuring and test equipment. Provisions are made, where appropriate, for the establishment of hold points, beyond which work may not continue until necessary inspections have been performed.

Inspections for acceptance are performed by individuals other than those who performed the activity being inspected. Personnel assigned to conduct inspections are qualified in accordance with applicable project-specific QAPPs. The Project Manager and Project Quality Manager will be responsible for performing the inspections, tests, and document reviews.

Inspections of required measuring and test equipment well be conducted in the field to verify that specific project performance requirements included in the QAPP, such as accuracy, precision, range, sensitivity, and stability have been satisfied. Provisions are made, where appropriate, for the establishment of hold points, beyond which work may not continue until necessary inspections have been performed.

Inspections for acceptance, including activity audits and document reviews, are performed by individuals other than those who performed the activity being inspected. Personnel assigned to conduct inspections are qualified in accordance with applicable project-specific QAPPs. The Project Manager and Project Quality Manager will be responsible for performing or delegating to qualified staff inspections, tests, and document reviews.

2.7.2 Documentation of Procedures

Controlling documents are developed within an overall document hierarchy that provides for an orderly and consistent set of controls applicable to appropriate AMEC organizational elements and activities. The extent and detail of controlling documents are commensurate with the degree of control required to achieve the required level of quality.

Controlling documents are prepared, reviewed for adequacy, approved for issue, revised, and canceled in accordance with applicable procedures.

Controlling documents (e.g., procedures, instructions, and drawings) that prescribe the conduct of activities that affect the quality of products and services are controlled through the use of indices or lists and through the maintenance of master copies of the documents by those responsible for their preparation, issue, and revision. The preparation, review, approval, issue, and change process is described and the approval authority for each document is specified in appropriate lower-tier documents. Document preparation, implementation, and assessment are often collaborative efforts between specialists, assistants, and support staff. The Project Quality Manager will have overall responsibility and final review and approval for project QA/QC documentation and will allocate specific tasks and assign roles to complete assignments.

Each procedure draft receives an independent review for technical adequacy and compliance with quality assurance program requirements. These reviews are performed by individuals competent in their fields. The Project Manager and Project Quality Manager will review and comment on all project documents.

After all comments are resolved, the writer forwards the completed procedure to the Project Quality Manager for approval processing. The Project Quality Manager serves as the Procedure Administrator on this project and is responsible for distribution of current procedures and for precluding the use of superseded or obsolete controlled documents.

The Project Quality Manager will ensure that a distribution list of document recipients is maintained such that revisions and updates can be distributed. The document control format will identify the document revision number and revision date. A document revision history will be maintained that identifies each revision and a summary of the revision. Copies of all revisions of a document will be retained in storage for reference purposes.

2.7.3 Deviations from Approved Documents and Procedures

Deviations from approved documents and procedures shall be documented and reported to management. The impact and significance of the deviation on planned operations shall be determined and notification made following appropriate levels of technical and management review. Documentation of changes shall be distributed to appropriate personnel to replace previous versions of the documents or procedures.

2.8 ASSESSMENT AND RESPONSE

The Project Quality Manager is responsible for developing an overall assessment plan and schedule conforming to applicable statutory, client, and management requirements.

Management assessments to qualitatively assess whether the quality management structure, policies, practices, and procedures are adequate to ensure that the type, quantity, and quality of data needed are being obtained will be conducted at a minimum of semi-annually. The AMEC Project Principal will conduct these reviews.

In addition, independent assessments such as audits are performed as defined by appropriate AMEC management, the Directory of Quality Assurance, or applicable regulations and contracts. The qualifications of personnel performing these assessments, including their independence from the activities they are assessing, are defined in applicable controlling documents. The results of an independent assessment may be adopted in lieu of performing a self-assessment at the discretion of the respective manager.

Results of the assessments are reported to management of the affected organization, the applicable Project Quality Manager, and the Directory of Quality Assurance. Evaluation, follow-up, and corrective action appropriate to the circumstances, and as required by controlling documents, are performed for identified non-compliances.

2.9 Assessment and Response

Project-Specific Assessments

The ***Table 1*** below identifies the different types of management reviews, technical system audits, and performance assessments that will be conducted to evaluate project activities. The type, frequency, and responsible parties of planned assessment activities for the project are identified.

Document assessment is a technical system audit that entails a technical review, completeness check, reasonableness of conclusions, recommendations, and disclaimers of draft and final versions of all planning documents. Data assessment determines whether the type, quantity, and quality of data needed are being obtained.

Other audits to ensure that specific requirements are being met include field sampling audits, audits of data validation and data management and laboratory performance samples.

Table 1. Project Assessments

Assessment Type	Frequency	Person Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person Responsible for Identifying and Implementing Corrective Actions (CA)	Person(s) Responsible for Monitoring Effectiveness of CA
Project Document Assessment	Each draft and final version of all documents	Project Manager and Project Quality Manager or Qualified Designee	Document Authors (Various)	Document Authors (Various)	Project Manager and Project Quality Manager
Field Sampling Procedures	Once during first week of field effort; semi-annually thereafter	Project Quality Manager or Qualified Designee	Field Task Leader (Various)	Field Task Leader (Various)	Project Quality Manager or Qualified Designee
Performance Evaluation Samples	Quarterly	Project Quality Manager or Qualified Designee	Laboratory Project Manager	Laboratory Project Manager	Project Quality Manager or Qualified Designee
Data Validation	After field events	Project Quality Manager or Qualified Designee	Data Validator	Data Validator	Project Quality Manager or Qualified Designee
Data Assessment	Quarterly or at the end of each program phase, whichever is more frequent	Project Manager	Project Manager	Project Manager	Project Quality Manager or Qualified Designee
Management System Review	Semi-annually	Principal in Charge	Project Manager	Project Manager	Principal in Charge
Laboratory Audits	Conducted only if performance monitoring indicates potential for systematic problems	Project Quality Manager or Qualified Designee	Laboratory QC Manager	Laboratory QC Manager	Project Quality Manager or Qualified Designee

Data used in the completion of a project will be evaluated by qualified personnel, to ensure that it meets the data quality objectives defined in the project-specific Quality Assurance Project Plan (QAPP). Data quality objectives will be specified in the QAPP based on the project-specific scope of work, anticipated use of the data, and project-specific contract requirements. AMEC will employ a variety of project-specific tools to assess data quality throughout the duration of the project. These may include but are not limited to document control forms, field audit checklists, data review checklists, data validation reports, data usability summary reports, performance evaluation sample summary reports, laboratory quality assurance manuals, laboratory audit checklists, and trend charts.

2.9.1 Objectivity, Independence, and Competence

The AMEC Director of Quality Assurance is responsible for ensuring that assessment team members are appropriately assigned to assessment activities. The Project Quality Manager is responsible for leading project-specific audits and ensuring that documentation is complete. An Audit Team may be assigned for multiple layers of review (financial, technical, procedural, etc.)

Assessment personnel are selected and assigned assessment responsibilities commensurate with their training and expertise and the special nature of the activities to be audited. They are independent of any direct responsibility for performance of any activity which they will assess. Persons having direct responsibility for performance of the activities are not involved in the selection of the assessment team.

Audits are scheduled in a manner to provide coverage and coordination with ongoing QA program activities. Audits are scheduled at a frequency commensurate with the status and importance of the activity. The Project Quality Manager and the audit team leader jointly develop and document an audit plan for each audit. The plan identifies the audit scope, requirements, audit personnel, activities to be audited, organizations to be notified, applicable documents, schedule, and written procedure or checklists.

The assessment team shall have sufficient organizational independence and authority, access to programs and managers, and organizational freedom to:

- Identify and document problems that affect quality.
- Identify and cite noteworthy practices that may be shared with others to improve the quality of their operations and products.
- Propose recommendations (if requested) for resolving problems that affect quality.
- Independently confirm the implementation and effectiveness of solutions.
- Provide documented assurance (if requested) to the Project Quality Manager that, when problems are identified, further work performed is monitored carefully until the problems are suitably resolved.
- All corrective actions are documented as taken to closure. The Project Quality Manager will review and sign-off on corrective actions and will maintain these documents in the project files.

2.9.2 Assessment Report and Reliability of Findings

The audit team leader prepares the audit report, which addresses purpose and scope of the audit, summary of the audit results, including a statement as to the effectiveness of the activities audited, and a description of each adverse finding in sufficient detail to enable responsible management to investigate, evaluate, and effect appropriate corrective action.

The audit team leader transmits the report to relevant management of the audited organization, Project Manager, audit team members, and Project Quality Manager. When applicable, the transmittal includes actions to be taken and the date a response is due from the audited organization. The requested response due date is not later than 30 calendar days from the receipt of the report by the audited organization.

In order to ensure the reliability of the audit findings, objective evidence is examined, and essential information is recorded, such as the identification of specific evidence examined, specific details of non-conformances or adverse conditions, and applicable references. Auditors analyze apparent non-conformances and adverse conditions, and their effect on the QA program, to assure their validity as adverse audit findings or audit weaknesses. The audit team leader conducts a post-audit conference with applicable representatives of the audited organization to present an objective overview of the audit results and to reach an understanding pertaining to any adverse findings. The results of any discussions are recorded. The Project Manager will provide assessment reports to the EPA and MDEQ project managers of any significant findings.

2.9.3 Assessment Response and Corrective Action

When an audit report contains adverse findings, the following actions are taken by the audited organization:

- Determine the actions required to correct the deficient condition.
- Evaluate each adverse condition to determine the root cause of the problem and any generic implications.
- Determine the corrective action required to correct the condition and to prevent recurrence.

A response to the audit report is returned to the Project Quality Manager within the required schedule. The response includes the audited organization's evaluation of the audit findings, including the identified cause and course of corrective action taken or to be taken. If corrective action is not completed, the response will include the proposed schedule for completion.

If a stalemate is reached concerning either the validity or resolution of an audit finding, the Project Quality Manager will escalate the concern to Corporate Director of Quality Assurance to affect a resolution.

The Project Quality Manager tracks open items to ensure that responses are received when due. Status reports are submitted monthly to the Project Manager until closure of open items. Overdue responses are brought to the attention of appropriate management for necessary action.

The Project Quality Manager ensures that responses are evaluated to determine the adequacy of the response, which includes the proposed or implemented plan of corrective action and schedule for its completion.

A periodic status of open audit findings is requested from the audited organization until all are closed. Upon closure of all open audit findings related to the audit report, a final status is provided to the audited organization stating that the audit report is closed.

The Project Quality Manager ensures that areas found weak or deficient in previous audits are addressed in the respective audit plans and/or re-audited to verify effective implementation of corrective action.

2.10 QUALITY IMPROVEMENT

AMEC's corporate and contract-specific QA/QC Program drives continuous improvement in the quality of our work products. The AMEC President directs the development of the AMEC Quality Policy that forms the basis for the QA Program. The AMEC Corporate Directory of Quality Assurance is responsible for continuously evaluating the QA program to identify areas for potential improvement.

The Project Manager and Project Quality Manager identify the Quality Assurance requirements (such as may be contained in the contract, task order, or related documents) applicable to the projects for which they are responsible. They also evaluate the existing QA Procedures and discipline-specific procedures to determine if they provide adequate controls to satisfy the identified requirements. If adequate controls are not included in the QA procedures or discipline-specific procedures, the Project Manager coordinates with the Project Quality Manager to determine if QA Procedures or discipline-specific procedures should be revised. If existing procedures are not revised, appropriate project-specific procedures are prepared and issued. Project-specific procedures are approved by the Project Manager.

All personnel are responsible for reporting conditions adverse to quality (CAQs) in accordance with applicable procedures. Managers are responsible for determining significance of project- and discipline-specific CAQs and for ensuring closure in a timely manner.

The Project Quality Manager is responsible for determining significance of CAQs that are not discipline-specific and for ensuring closure in a timely manner.

The Project Quality Manager is responsible for maintaining a Corrective Action Request Status Log, coordinating activities related to the processing of applicable significant CAQs, and tracking them to closure.

When a significant CAQ has been identified, a request for corrective action (CAR) is forwarded to the applicable Project Quality Manager for assignment of a unique tracking number.

Copies of the CAR are forwarded to the Project Manager and others as appropriate based on the nature of the condition.

The Project Quality Manager, with the applicable manager, assigns the CAR to an individual for determination of root cause, generic implications to other projects or activities, and determination of corrective action to resolve the condition and to prevent recurrence. A schedule for completion of these activities is established.

A root-cause analysis is completed to sufficient depth to assure that correction of the identified cause will prevent recurrence of the condition. After completion of the root cause analysis, an assessment is conducted to determine whether the problems associated with the nonconforming condition are limited to that condition or whether the problems are more broad or generic in nature and are likely to exist elsewhere.

A proposed course of action is developed to correct the nonconforming condition and any identified generic problems and a proposed course of action is developed to prevent recurrence of the condition and to address generic implications. The results of the root cause analysis and generic implications evaluation and proposed corrective action are documented on the CAR. The Project Quality Manager ensures that the CAR is reviewed by appropriate managers to verify the adequacy of the response. After receiving concurrence from applicable personnel, the CAR is issued to an individual for implementation of corrective action. A schedule for completion is established.

Upon notification that corrective action has been completed, the Project Quality Manager "sign-off" on corrective actions to verify that completion is performed and closes the CAR. Copies of the closed CAR are provided to original recipients.

The Project Quality Manager maintains an open tracking item, when applicable; to ensure that corrective action is taken to closure and future verification that the corrective action has been effective in preventing reoccurrence.

REFERENCES

ANSI/ASQC E4-1994. 1994. *Specifications and Guidelines for Quality Systems for Environmental Data and Technology Programs.* American National Standard.

U.S. Environmental Protection Agency. 2001. *EPA Requirements for Quality Management Plans (*EPA QA/R-2*)*, EPA/240/B-01/002. Office of Environmental Information.

U.S. Environmental Protection Agency. 2006. *Guidance for the Data Quality Objectives Process (QA/G-4)*, EPA/240/B-06/001. Office of Environmental Information. February.

Appendix I
Resumes of Project Staff

Garret Bondy, PE – Project Manager / Regulatory Lead	Years Experience	
	Total 31	**Yrs. with Firm** 19
Education: BS, Environmental Science Engineering, 1979	**Registration/Certification:** Professional Engineer - Environmental, OH, 1994, #60789, MI, 1990, #6201038030	

Why Selected:

- Mre than 25 years experience working on CERCLA sitesFormer USEPA Region 6 Superfund Section Chief
- 20 years experience on more than 50 PCB projects
- Worked on more than 15 Great Lakes sediment projects, including 3 under GLLA

Sample Projects:

Senior Project Manager, Ohio River Sediment RI/FS/Remedy Negotiation, Ironton Tar Plant Superfund Site – Ohio River, Ironton, OH—As Senior Project Manager on the $25M Ironton Tar Plant project, where sediments next to the site in the Ohio River are contaminated with polynuclear aromatic hydrocarbons, Mr. Bondy directed the project team in conducting an RI and developing and evaluating remedial alternatives in a feasibility study (FS) submitted to USEPA. Mr. Bondy presented the results of the FS to USEPA and assisted his client in negotiating a favorable remedy for sediments. The remedy, as memorialized in the ROD, specifies upstream toxicity units as the cleanup criteria (rather than theoretical risk-based criteria) and allows a flexible combination of MNR, capping and dredging. The design, which is underway, will include facets that will provide NRD credits.

Senior Project Manager, RI/FS/Remedy Development, Old Rockwell Site, Kalamazoo River, Allegan, MI—This 30-acre, former automotive parts manufacturing facility is located on a peninsula of the Kalamazoo River. Many source areas have led to PCBs, LNAPLs, VOCs, SVOCs, and metals discharging to the river. Under Mr. Bondy's management, AMEC conducted several site investigations and provided technical oversight of other consultants for the State of Michigan. Under Mr. Bondy's management, AMEC oversaw the offsite excavation of PCB and dioxin contaminated soil in the adjacent residential area. Mr. Bondy also provided technical support to the State of Michigan and the USEPA during the development of the Feasibility Study and the subsequent Proposed Plan, which ultimately was memorialized in the ROD. The primary objective of the remedy was to mitigate contamination migration to the river.

Senior Project Manager, RI/FS/Authored First GLLA Application/Dredging Oversight, Black Lagoon Detroit River, Trenton, MI—Responsible for principal engineering review of the project activities. These activities included data gap analysis to address PCBs in sediment. Developed SOW for additional data collection implemented by GLNPO, conducted remedial alternatives evaluation/focused FS; evaluated short-term/long-term of remedy effectiveness; completed addendum of Detroit River RAP; authored on behalf of MDEQ (as non-Federal Sponsor), first successful GLLA proposal; provided logistical support including PCB mass estimates to GLNPO for use in public meetings; implemented post-dredging sampling; assisted with the QAPP; provided oversight and technical support during phase II of dredging.

Project Manager, Sediment RI/FS/Remediation Design/Sediment Removal/Construction Management, Black River, Bangor, MI—Responsible for principal engineering review and QA/QC of all project activities. The project scope required remediation of 27,000 CY of sediment significantly impacted with chromium and PCB contaminants in the Black River, in Southwestern Michigan. Conducted site investigation, risk characterization and feasibility study; developed remediation design and bid package; obtained wetlands and waterways permits; procured contractor and provided construction management; and participated in regular public/community meetings. Resulted in restoration of natural habitat state for recreational use. Won Michigan Association of Environmental Professionals Remediation of the Year Award and an Award from the Southwest Michigan Council of Governments for Intergovernmental Agency Cooperation.

Client Representative, Ottawa River, Sediment Remediation, Maumee River AOC, OH—On this nearly $50M project, as a member of the Ottawa River Group (ORG), a Non-Federal Sponsor group in partnership with GLNPO, Mr. Bondy represented his industrial client on the ORG. Mr. Bondy assisted in development of the Project Agreement between GLNPO and ORG, calling for dredging of 250,000 cubic yards of PCB contaminated sediments. To help his client assess the proposed scope of the project, Mr. Bondy led the team's independent estimate of dredge prisms. Mr. Bondy participated in the development of specifications to procure a contractor for dewatering dredged sediments and water treatment (the ORG's share of the project) and in procuring a contractor. Throughout the project, Mr. Bondy actively monitored progress in achieving cleanup goals within budget. As part of negotiating cost sharing amongst the ORG members, Mr. Bondy lead the AMEC team evaluating his client's likely contribution of contaminants (and hence remedial liability) compared to other members of the ORG. His team's evaluation was used to significantly reduce his client's liability. Mr. Bondy is currently assisting his client as the NRD portion of the project progresses.

Senior Project Manager, Superfund RI/FS and Remedy Negotiation, Confidential Automobile Parts Manufacturer, Ionia, MI**—**For this Superfund project, Mr. Bondy directed the completion of an RI/FS to address metals and phosphorous in groundwater discharging to a nearby creek, in accordance with an Administrative Order of Consent. He directed the formulation of technical positions to limit the scope of the RI/FS and negotiated with USEPA to limit the site remedy to groundwater monitoring. During the negotiations, technical justifications for reducing the scope of the monitoring were presented and, based on a request by AMEC, USEPA has also agreed to begin delisting the site from the NPL.

Senior Project Manager, RI/FS, Lower Rouge River–Old Channel, Detroit MI**—**Responsible for development of RI/FS SOW attached to Project Agreement and approved by GLNPO. Scope of work includes sediment and porewater sampling, hydrographic surveys, and use of innovative characterization technologies to identify possible upland sources *(TarGost®)* and potential in river sources *(UVOST®).* In support of SOW development, managed and reviewed results from historic property uses to identify possible sources and specify sample locations and approaches. Responsible for public outreach program including briefings for GLNPO, the City of Detroit, the Economic Development Corp., MDEQ, and local businesses. Mr. Bondy is currently providing strategic direction and principal review of the ongoing feasibility study.

Senior Principal Engineer, Stryker Bay, St. Louis River, Duluth, MN**—**Mr. Bondy was tasked with identifying the likely source(s) of coal tar in sediment. Mr. Bondy directed a multi- discipline team consisting of engineers and chemists in the review historic operating records and practices of various coking and tar plant operations in the area and historic information from other similar facilities across the country. The team reviewed sediment analytical results and used the PAH concentration patterns and ration to further evaluate the likely source. Results of the team's evaluation were used in litigation to gain a favorable settlement saving his client more than $20 million.

Senior Project Manager, Peer Review, Willamette River, Portland, OR**—**Member of an expert panel consisting of engineers, hydrogeologist, chemists, and toxicologists to review results of $95M remedial investigation by outside parties. Review focused on possible past/ongoing sources and degree of risk to human and ecological receptors associated with PCBs, metals and various organic compounds.

Principal Project Engineer, Sediment RI/FS/and Remedy Development Assistance, Upper Trenton Channel, Detroit River, MI**—**Leading team in assisting major insurance company and their Insureds in reviewing an RI/FS completed by USEPA-GLNPO and Insureds (i.e., the non-Federal Sponsor) to address PCBs, PAHs and mercury in sediment. Assisting the insurance company and the Insureds in developing an acceptable remedy with USEPA-GLNPO.

Ann Bernhardt, CMQ/OE – Quality Manager	Years Experience	
	Total 22	**Yrs. with Firm** 20
Education: BS, Environmental Science, 1991	**Registration/Certification:** Certified Manager of Quality/Organizational Excellence, American Society for Quality, #11430	

Why Selected:

- Routinely fills Quality Manager role on large contaminant-related projects
- Has developed and managed laboratory procurement and data management systems for large industrial client
- Experience with EPA QA/QC program requirements

Ms. Bernhardt is a Quality Control Program Manager with 22 years of experience. Her efforts focus on large-scale environmental programs with an emphasis in information management and data quality. She is responsible for analytical quality across the life cycle of a project including data collection strategies, data management, data validation, reporting, and database archive. Ms. Bernhardt is AMEC's Navy QC Manager and Air Force Program Chemist coordinating project needs and analytical requirements. She conducts laboratory audits assessing compliance and analytical procedures of environmental laboratories. Ms. Bernhardt has developed a laboratory program for a Class I railroad detailing analytical procedures, QA/QC parameters, and data deliverable requirements. The laboratory program is web-based, providing access to hundreds of consultants and laboratories in support of the client.

Ms. Bernhardt prepares Quality Assurance Project Plans and analytical Statements of Work; selects analytical methodology; evaluates laboratory proposals; establishes QA/QC parameters; and coordinates deliverables and turnaround times. Ms. Bernhardt provides auditing services to assess analytical laboratory procedures, documentation, defensibility of data packages and electronic deliverables. She leads a team of data validators tasked with data interpretation and data usability assessments.

Ms. Bernhardt previously served as an analytical chemist with environmental laboratories. She is very familiar with U.S. Environmental Protection Agency (USEPA) analytical protocols, data assessments, laboratory procedures, and laboratory quality assurance. Ms. Bernhardt manages a team of chemists, quality assurance professionals, geographic information specialists, and data managers.

Sample Projects:

Quality Control Program Manager, Performance-Based Environmental Multiple Award Contract (PERMAC) for Environmental Remediation Services—AMEC has been awarded five task orders totaling $93M under the current $120M Performance-Based Multiple Award Contract (PERMAC). Ms. Bernhardt is the Quality Control Program Manager for PERMAC. She is responsible for Sampling and Analysis Plan preparation adhering to the UFP-QAPP requirements and the quality control of AMEC field programs, construction activities, and deliverables across all task orders. Projects include design and construction of a soil cover over a landfill and groundwater remediation at the former NAS Alameda (CTO 0002), Site-Wide Groundwater Monitoring, Alameda California (CTO 0003). This large-scale monitoring program includes the sampling and analysis of over 300 monitoring wells. Additional projects include Alameda Petroleum Field Work (CTO 0004), Removal Action at Hangar One Moffett Field (CTO 0005); and

Pesticide Remediation at Camp Pendleton performed under CTO 0006. AMEC has received an “OUTSTANDING” ACASS rating for its work on the Camp Pendleton project.

Laboratory Program Management, CSX Transportation—Ms. Bernhardt created a laboratory program for this major US railroad company which established quality laboratories in the program, leveraged the volume of analytical work to achieve cost-effective pricing, and standardized data reporting across all consultants working for CSXT. The project establishes quality guidelines for environmental laboratory analysis, web-based tools for initiating lab services, and quality monitoring of a network of laboratories. AMEC assisted in the selection of the laboratories by developing a SOW, issuing an RFP, evaluating and rating proposals for final selection by CSXT. AMEC provides ongoing evaluation of laboratory performance through audits and performance evaluation studies. AMEC developed a CSXT Laboratory Program website for distributing program information, development of a web-based project management tool to handle laboratory projects, documentation of laboratory procedures in an online and hardcopy manual. The website is used by hundreds of consultants, laboratory staff, and CSXT managers.

Project Manager, Hydro One Networks, Inc., Polychlorinated Biphenyl Program, Laboratory Audit—AMEC provided expert, third party review and audit of the polychlorinated biphenyl (PCB) analytical methodologies and statements of measurement uncertainty associated with the analysis of PCBs. AMEC reviewed quality system documentation, verified measurement uncertainty calculations, and verified methods used in analysis. The purpose of the work was to evaluate uncertainty in the reported data versus compliance requirements so that Hydro One could establish decision points for acceptance. Ms. Bernhardt was the Project Manager and the review of quality systems.

Quality Control Manager, Small Arms Firing Ranges Restoration Project, Oregon Military Department, Camp Withycombe, Clackamas, OR—AMEC has completed the RI, FS, and the RA is underway at seven former small arms firing ranges. Extenstive sampling has been conducted and Ms. Bernhardt oversaw the data validation of the project and preparation of project QAPPs. Various matrices including soil, sediment, plant tissue/trees, groundwater, surface water, and stormwater were sampled for metals and explosive residues. Served as Project QC Manager for the Time Critical Removal Action phase of work.

Project Manager, Confidential Aerospace Client, Portland, OR—Ms. Bernhardt was the project manager and a lead technical specialist providing quality assurance support to an in-house manufacturing quality control laboratory. AMEC developed and refined standard operating procedures, wrote a compliant quality manual compliant with ISO17025, trained laboratory staff in the new procedures, and provided method development support. AMEC provided 2 full time on-site chemists to assist the lab in the implementation of the new quality system and while the laboratory was limited in staff. AMEC assisted with the purchase of a new autotitrator and verified approximately 35 methods on the new system. AMEC chemists coordinated within the confidential company on method development and refinement for various metal finishing chemical procedures.

Program Data Manager, Massachusetts Military Reservation, Impact Area Groundwater Study Program, Camp Edwards, MA—As the Program Data Manager from 1997 to 2004 Ms. Bernhardt was responsible for data receipt, format, upload, and maintenance of a large-scale chemical and geological database in AFCEE ERPIMS format. She coordinated with AMEC’s field office to directly upload the sample collection information, monitoring well construction data, and soil boring lithology into the database. Ms. Bernhardt presented statistical data summaries for various project deliverables from AMEC’s dataset of more than 57,000 samples.

Cynthia Draper, PE – Project Principal	Years Experience	
	Total 26	**Yrs. with Firm** 22

Education:	**Registration/Certification:**
Master of Science, Environmental Engineering, Pennsylvania State University, 1986 Bachelor of Science, Environmental Engineering, Pennsylvania State University, 1984	Professional Engineer - Civil & Environmental, GA, PE018719 HAZWOPER 40 Hour with current 8 hour Refresher HAZWOPER 8 Hour Supervisor

Why Selected:

- 26 years of remedial investigation feasibility study experience, including sediment projects
- Manager CERCLA project in USEPA Region 5

Sample Projects:

Project Manager: McIntosh Superfund Site, Operable Unit 2, Remedial Investigation/Feasibility Study (RI/FS) and Cap Design, McIntosh, AL. Lead multi-disciplined team of engineers and scientists through the RI/FS and remedial process. USEPA approved the FS, which recommends aqueous capping of mercury containing sediment in approximately 80 acres of an oxbow lake. Selection of this non-dredge remedial alternative represents a savings of $50,000,000 over dredge alternatives, which were initially favored by USEPA. Many documents and studies were completed between 2006 and 2012 including a $5 Million engineering effort to contain sediments while enhancing natural deposition of clean sediment. Remedial design studies have been initiated and a ROD is expected in early 2013. Project was selected for a platform presentation at the 2013 Battelle conference on the subject of adaptive management techniques for sediment sites. Responsibilities included development of remedial strategies, technical quality, negotiation with USEPA and other stake holders, and adherence to a challenging schedule and budget.

***Feasibility Study Engineer: North Folk Holston River, FS, Saltville, VA*. Responsible for technical direction and quality of the FS. Work included response to agency comments on the FS and meetings with the USEPA and Virginia Department of Environmental Quality, and data management. Recommended remedy is monitored natural attenuation for sediments containing mercury in 150 river miles.

***Feasibility Study Engineer: HoltraChem Superfund Site, Riegelwood, NC*. Provided consulting services for the RI of a PCB contaminated site and provided technical direction for the FS. Responsibilities include review of project documents (such as work plans, RI, groundwater modeling) and costing remedial actions.

***Project Manager: Big D Campground Superfund Site Natural Attenuation Study and Groundwater Monitoring, Kingsville, OH*. Monitored Natural Attenuation (MNA) demonstration study to demonstrate that MNA of PCE and daughter products is equal or more effective than the pump and treat system initially installed and operated at the site. Evaluated data for consistency with MNA protocols; main author for semi-annual reports and MNA Demonstration reports; selected and verified data presentation format (tables, figures, models); and made presentations to USEPA, OEPA, and client's management team. USPEA and Ohio EPA are currently considering a change in the selected remedy from pump and treat to MNA.

Remediation Engineer: Confidential Augusta Chemical Manufacturer Corrective Action Evaluation, Augusta, GA**.** Performed hydrological review and corrective action evaluation for remedial action at a manufacturing site. Final remedy was capping of mercury containing sediment. Responsible for investigation results interpretation, evaluation and selection of remedial option, review of design work plan for conformance, and presentation of plan to GA EPD.

Project Manager: Palmetto Recycling Superfund Site, Columbia, SC. Environmental services for remedial action of a former battery recycling facility. Services included collaboration with USEPA and South Carolina Department of Health and Environmental Control (SCDHEC), a Consent Order between the client and USEPA, a Remedial Design, Remedial Action (RA) Work Plan, Implementation of the RA and long-term groundwater monitoring, and eventual removal of the site from the NLP. Responsible for communications with client and USEPA, budget, and schedule. Reviewed consent order on behalf of Lucent Technologies. Revisions resulted in savings of $150,000 in the design and remediation phases of the project. Evaluated field data and prepared the design documents, remedial action plan, and bid specifications. Held pre-bid meeting and recommended the selection of remediation contractor to Lucent. Reviewed contractor work and approved for payment. Prepared remedial action report with certifications. Maintained PM position on 5 years of groundwater monitoring at the site and assisted USEPA successful with deletion from the NLP.

Project Manager: Green River Superfund Site, KY. Responsible for RI/FS including design of a statistically-based sampling plan to identify 4 contaminated acres among 25. The RI and FS were submitted simultaneously resulting in a $200,000 savings for the client. FS focused on a presumptive remedy of capping for the landfill and leachate collection/treatment. Design documents and bid specifications were prepared for leachate collection, treatment and discharge. Approximate value of the project from immediate response to design submittal was $2,000,000. Personally defended work products and educated local community environmental groups at meetings sponsored by the principal responsible parties (PRPs). The purpose of the meetings was to answer questions raised by this group and to explain the results of the RI/FS.

Feasibility Study Engineer: Eastern Diversified Metals (EDM) Superfund Site, PA. Prepared statistical evaluation of PCB-contaminated "fluff" piles to support recycling of PVC and PE plastics as part of the RA. Evaluated contractor methods, costs, and flow diagrams to segregate and recover plastics with various densities from contaminated debris piles.

Feasibility Study Engineer: U.S. Air Force Center for Engineering and the Environment (AFCEE) 4P Defense Supply Center Richmond (DSCR) Feasibility Study Investigations, Richmond, VA**.** Supplemental remedial investigations, water quality monitoring, data collection and reporting to complete and revise feasibility studies, proposed plans, and Records of Decision (RODs), and supporting the environmental restoration mission at Defense Supply Center Richmond (DSCR). Successfully guided remedial selection for contaminated groundwater to MNA with a contingency for in situ bioremediation in ROD. Responsible for providing Principal-level review for preparation of four feasibility studies at DSCR. Served as Principal Author for feasibility studies for OUs 8 and 13. Also responsible for presenting process and results for feasibility studies to Remedial Action Board and at public meetings.

Clifford J. Whitmus, Jr. - Project Advisor / Technical Expert	YEARS EXPERIENCE	
	Total 37	**Yrs. with Firm** 6

Education:	**Registration/Certification:**
M.S., Fisheries Biology, University of Washington, College of Fisheries and Oceanography, 1985 B.S., Fisheries Science, University of Washington, College of Fisheries, 1975	40-Hour Hazardous Material Training, 1991 8-Hour Hazardous Material Supervisor

Why Selected:

- Completed more than 50 sediment investigation projects in both marine and fresh water under the Resource Conservation and Recovery Act (RCRA); and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
- Project Manager for Lower Duwamish Waterway PCB remediation
- Experienced in Natural Resource Damage assessment

Sample Projects:

Project Manager, RCRA Sediment Remediation, Confidential Aerospace Company, Seattle, WA. Mr. Whitmus managed a multidisciplinary team for design and permitting of a RCRA sediment cleanup at the Duwamish Waterway. The site has also been designated an Early Action Area (EAA) under Superfund because the cleanup area is located within the Lower Duwamish Waterway Superfund site. The cleanup area encompasses approximately 4,000 linear feet of the Waterway next to the federal navigation channel and covers about 10 acres. The primary constituent of concern for the site is PCBs, which are ubiquitous throughout the Waterway. Since work began on this project in 1998, over 100 sediment cores have been collected and approximately 300 PCB analyses have been conducted. Work includes agency negotiations, development of sediment and soil sampling Quality Assurance Project Plans (QAPPs), sediment sampling and analysis, remedial alternatives development and analysis, interim measure design and construction, and remedial design. Construction of the Corrective Measure began in January 2013 and is expect to take 3 years to complete.

Project Manager, Hylebos Waterway Property Acquisition, American Construction Company, Tacoma, WA. Mr. Whitmus led a project team for a CERCLA remedial investigation and feasibility study to assess the distribution of contaminated sediments in the Hylebos Waterway. Work has included agency negotiations, development of sampling and analysis plans, supervision of field data collection, and data analysis and reporting. This project was unique in that a QAPP was prepared, sampling was conducted, a data report was prepared and submitted, and a remedial design was approved by USEPA within 8 weeks of beginning the project. American also assumed partial Natural Resource Damage (NRD) liability for the site. Work included meeting with the Trustees to present conceptual approach for the Settlement Proposal and identifying potential restoration sites. Based on this work, the Trustees decided not to assess NRD claims against American.

Project Manager, Marine Terminal Improvements Project, Port of Everett, Everett, WA. Mr. Whitmus managed/directed the completion of following activities: Puget Sound Dredged Disposal Analysis (PSDDA) partial characterization at the Port's proposed Pacific Terminal site; PSDDA full characterization and SMS characterization at Piers 1 and 3; multidisciplinary team investigation for nearshore confined disposal of contaminated sediments associated with the

Port's proposed Pacific Terminal; PSDDA full characterization of the approaches to the Pacific Terminal; and 401 Water Quality Certification compliance monitoring of dredging. This work led to the construction of a 130,000-cy contaminated sediment confined-disposal facility on which a marine terminal was constructed. This was the first project for which a Cleanup Action Decision under the Sediment Management Standards was issued by the Washington State Department of Ecology.

Project Manager, Former Mill A MTCA Support Sample Collection, Port of Everett, Everett, WA. This project included sediment characterization of a site in Port Gardner, Washington, that was listed on the State of Washington's Contaminated Sediment Site List in 1996. In response to the Washington Governor's Puget Sound Initiative, a characterization of the sediments in the area was conducted to determine what, if any, remediation or other action needs to be taken to seek a delisting of the area from the Contaminated Site List. Work included the preparation of a QAPP for the sediment investigation, collection of core and grab samples, chemical analysis of sediment samples, and preparation of a data report that was submitted to the Washington State Department of Ecology.

Project Manager, Whitmarsh Landfill, Whitmarsh PLP Group, Anacortes, WA. Mr. Whitmus directed sediment investigations at the former Whitmarsh Landfill. Work is being conducted as part of the Puget Sound Initiative administered by the Washington State Department of Ecology. Work has included agency negotiations, preparation of sediment remedial investigation work plans, oversight of sediment sample collection, chemical and biological analyses, and reporting results to State regulators. Work has focused on potential risk of PCBs and dioxins/furans on native populations.

Project Manager, Hylebos Waterway Wood Debris Program, Hylebos Wood Debris Group-Floyd & Snider Inc., Tacoma, WA. Co-managed with Floyd & Snider the Model Toxics Control Act (MTCA) remedial investigation and feasibility study to assess the distribution of wood debris at the head of the Hylebos Waterway from historical and ongoing log handling. Work included agency negotiations, development of sampling and analysis plans, supervision of field data collection, and data analysis and reporting. Also prepared biological assessment for the Corps of Engineers to evaluate potential impacts of proposed remedial actions on federal species of concern.

Project Manager, Sediment Survey, Lower Coeur d´Alene River and Lateral Lakes, Coeur d´Alene River, ID. Work included the collection of approximately 150 sediment cores from the floodplain, mainstem, and lateral lakes of the lower Coeur d´Alene River National Priorities List (NPL) Site. The purpose of this investigation was to determine the vertical distribution of contaminants from historical mining operations.

Technical Assistance, Natural Resource Damage Assessment, Confidential Client, WA. Currently working with a group of PRPs to evaluate opportunities for restoration based settlements for discharging NRD liability. Work has included calculating injury (in DSAYS) using Habitat Equivalency Analysis for 23 chemicals. Have assisted a Third Party Allocator with determining injury by chemical and location. In addition, have evaluated numerous potential projects to determine restoration value.

<table>
<tr><td colspan="2" rowspan="2">Richard Beach - Project Advisor / Technical Expert</td><td colspan="2">Years Experience</td></tr>
<tr><td>Total
32</td><td>Yrs. with Firm
3</td></tr>
<tr><td>Education:
BS, Biology (Marine Emphasis)
MS, Chemical Oceanography</td><td colspan="3">Registration/Certification:
SCUBA Diving Instructor, NAUI #6180, 1981. (Research Diving Program)</td></tr>
</table>

Why Selected:

- Diverse understanding of contaminated sediments, chemical oceanography, marine biology, analytical chemistry, nutrient geochemistry, spill response, and hazardous materials. His experience includes projects and programs where he has managed, directed, and implemented sediment projects, hazardous materials management, site investigations, base and field laboratory services, remediation services, litigation support, and compliance audits.
- 20 years experience developing sediment CSMs.
- Develops/implements sediment sampling plans using pore water toxicity approaches.
- Experience in 6 USEPA regions.
- Technical lead for biological, chemical, geomorphic evaluations and modeling ($23M) of 135 mile Rest of River reach of the Housatonic River.

Sample Projects:

Practice Leader: Water & Sediments - Service Lines, Multiple Locations and Clients. Responsible for technical service teams implementing projects involving sediments & dredging, ecosystems, wetlands, water resources, and water supply/wastewater. Direct support for many projects including development of technical approaches, trouble shooting, and client support. Contributed to project optimizations and reviews for the:

- Passaic River (NJ) Litigation support (confidential client)
- Ironton Tar (MI) 30% Design activities (confidential client)
- Lower Rouge River Old Channel (MI) Remedial investigation/feasibility study (confidential client)
- Detroit River Coke (MI) Supplemental sediment Investigation (confidential client)
- Callahan Mine (ME) Pre-Design activities (Maine DOT)
- Portland (OR) Sediment creosote pore water investigation (confidential client)
- Delaware River (PA) Remedial investigations and site planning for former manufacturing site (confidential client)
- Housatonic River (CT) ecosystem restoration (USACE-EPA client)
- Cannelton/Tannery Bay (MI) sediment remediation (GLNPO client)
- Delaware River (PA) Port Authority Feasibility Study (FS) for the use of dredged material for land development (DRPA client)
- South Florida Water Management District dredging contract (SFWMD client)
- Miami River (FL) maintenance dredging (USACE client)
- Dames Point Terminal (FL) development (Jacksonville Port Authority client)
- Remedial Investigation/FS (RI/FS) (NJ) of a complex contaminated land, wetlands, water, and sediment site (confidential client)

Senior Principal Scientist– Detroit River Investigation, Detroit, MI. Evaluated the proposed RI work plan and recommended alternative approaches in defining the nature and extent of metals and PAHs. Developed analytical protocol for the analysis of ammonia in pore waters and bulk sediments to evaluate potential upland contributions to nutrients already existing in the natural environment. Incorporated bioavailability approaches to evaluate PAH toxicity to benthic community. Authoring RI report to evaluate potential ammonia, cyanide, chloride, and PAH impacts to the Detroit River.

Senior Principal Scientist– Lower Rouge River Old Channel Feasibility Study, Detroit, MI. Critically reviewed the draft RI, evaluated data gaps, and proposed migrating investigatory tasks to the FS to maintain aggressive schedule. Assess the merits and correlation of equilibrium PAHs in pore water and bulk sediments to reduce the conservative assumptions in the RI and help develop a risk based remedial approach. Also conducted initial PAH fingerprinting analyses to evaluate potential on-going sources.

Technical Specialist- Kalamazoo River Litigation Support, Kalamazoo, MI. Responsible for identifying responsible parties and supporting legal actions for their inclusion in the $100+ million PCB remediation of the 85-mile long Kalamazoo River PCB Superfund site. Scope: Evaluation of the primary RI/FS and background information collected over a 10-year period; forensic assessment of the validity of a multiple Aroclor analytical technique on weathered sediments and the related data; and review of records from four industrial facilities, related RI/FSs, human health risk assessments, and 65 depositions to determine potential contributions from each facility. All four of the entities were incorporated into the remedial action.

Senior Principal Scientist– Buffalo River Sediment Project, Buffalo, NY. Reviewed the RI/FS, the sampling plan for Sub Area D, the USACE dredging plan, and the Residual Management Plan. Revised the Sub Area D sampling plan to incorporate alternative uses of multi-beam surveys in delineating the spatial extent of the historic sediment cap. Provided constructability review on the PCB dredging plan and potential conflicts with landside shore facilities and likely remedial approaches. Developed an improved recovery model equation to account for contaminants in newly deposited sediments for simplified evaluation of potential remedies.

Senior Principal Scientist– Ironton Tar Pre-Remedial Studies and Remedial Design (RD), Ohio River, OH. Conducted data gap analysis of historic and recent studies, developed innovative approaches and revised the pre-design RI work plan to better characterize the nature and extent of contamination, assess potential migration pathways and transport mechanisms, and evaluate geotechnical characteristics of the sediment. Also designed, built and implemented a low-profile, underwater video – sediment probing system to evaluate surficial sediments in the river parcel to guide sediment sampling and evaluate the mixed deposition areas. Authored portions of the 30% RD for the capping and/or dredging remedy specified in the Consent Order to address the risks posed by polycyclic aromatic hydrocarbons (PAHs) at the 28-acre former industrial tar plant site (7 acres in-water).

Remedial Services & Analytical Laboratory Director: Hydrosystems Technical Services Development, Sterling, VA. Responsible for the creation and direction of the Remedial Services Division for the research and development (R&D) and implementation of innovative biological, chemical, and physical technologies to remediate hazardous wastes (with a focus on PAHs and PCBs). Also created and directed an organics analytical laboratory that obtained approval for Superfund analyses, a field analytical services group, a treatability laboratory, and a biotechnology department. Developed analytical screening methods for volatile organics, PAHs, and PCBs for use on federal and state-designated Superfund sites.

Technical Director/Project Manager: USACE - Housatonic River PCB Project, Pittsfield, MA. Responsible for the cost, schedule, and technical quality of $23M in task orders related to the "Rest of River" Operable Unit, including directing the multidisciplinary project's biological, chemical, and geomorphological investigations. Technical liaison with USACE and USEPA Project Managers to coordinate investigations, studies, and river modeling. Managed the studies of the 135-mile reach of the Housatonic River, which included ecological and human health risk assessments, site characterization, storm water monitoring program, and the development of a state-of-the-art 3D model simulation of the river. Designed and implemented a large pore-water and surface-water PCB congener partitioning study, and developed remediation monitoring techniques to evaluate potential PCB releases impacting the "Rest of River". Established strategy to minimize analytical sampling of PCBs and congeners in co-located areas of interest in the river to reduce costs and maximize shared information among multiple consultants and stakeholders. Directed and lead the forensic evaluation of PCB Aroclors and congeners to assess the potential inputs to the river from storm events, secondary erosion areas, and new sources.

<table>
<tr><th rowspan="2">Steven Ellis, PhD – Risk Assessment Lead</th><th colspan="2">YEARS EXPERIENCE</th></tr>
<tr><th>Total
32</th><th>Yrs. with Firm
6</th></tr>
<tr><td>Education:
PhD, Biological Oceanography, Oregon State University, 1991
MS, Biological Oceanography, Oregon State University, 1984
BA, Biology, Lawrence University, 1980</td><td colspan="2">Registration/Certification:
Qualified Senior Writer for Biological Assessment, Washington State Department of Transportation, February 2010</td></tr>
</table>

Why Selected:

- 32 years experience completing ecological and human health risk assessments
- Has completed over 30 risk assessments specific to sediments
- Directed long term multi-million dollar risk assessments in large watersheds
- Expert witness
- Published author for papers on PCB impacts in ecological receptors.

Representative Project Experience:

Principal Scientist, Polychlorinated Biphenyls Food-Web Modeling for the Housatonic River, MA. Provided technical support and oversight for the application and calibration of the AQUATOX food-web model to evaluate the bioaccumulation of sediment PCBs into selected fish, birds, mammals, and amphibians. This project was undertaken to develop remedial options for PCBs in the Housatonic River sediments as part of a remedial investigation and feasibility study.

Principal Scientist, Duwamish Waterway Sediment PCB Remediation Alternatives Analysis, The Boeing Company, Seattle, WA. Calculated PCB air concentrations likely to result from PCB volatilization from different sediment remediation alternatives for the Duwamish Waterway. Risk estimates for all alternatives were substantially below threshold levels of concern.

Project Manager, Voluntary Cleanup Program Support for Aquatic Impacts Associated with the St. Helens Mill, Boise Cascade, OR. Assisted Boise Cascade with technical and strategic support to characterize and potentially remediate areas of the Multnomah Channel near historical discharges from the St. Helens Mill. Activities were conducted within the framework of Oregon's voluntary cleanup program. Assessed tidally-driven upstream sediment transport; conducted Phase I and II human and ecological risk assessments; and designed field sampling programs. Main contaminants of concern included PCBs, dioxins, and PAHs.

Project Manager, Willamette River Basin Water Quality Study; Oregon Department of Environmental Quality, Willamette River, OR. Developed modeling tools and biological indices for assessing water quality in the Willamette River basin. Compiled and evaluated historical data on nutrients, dissolved oxygen (DO), bacteria, PCBs, dioxins and furans, pesticides, trace metals, aquatic biota, and point and nonpoint sources of pollutant loading; calibrated steady-state models QUAL2E for DO, nutrients, bacteria, trace metals, and dioxins in the water column and sediments; conducted field surveys of benthic invertebrates and fish communities; developed a fish-habitat index and benthic-invertebrate index tailored to the Willamette River; and developed a biological index based on the frequency of juvenile-fish skeletal deformities. Delivered presentations to the public and the state legislature.

Principal In Charge, Lower Columbia River Bi-State Program for Columbia River Water and Sediment Quality Assessment, Washington State Department of Ecology, Oregon Department of Environmental Quality, Washington Public Ports Association, and Northwest Pulp & Paper Association, WA and OR. Developed solutions to identify water quality problems in the lower 146 miles of the Columbia River for 6-year, $2.4-million contract. Designed and implemented field surveys to measure levels of polychlorinated biphenyls, dioxins and furans, polycyclic aromatic hydrocarbons, pesticides, and trace metals in water, sediment, and biota. Inventoried and characterized point and nonpoint pollutant loads to the river. Assessed potential biological indicators (fish enzyme levels, fish skeletal deformities, fish autopsy, and fish and benthic community abundance and diversity). Conducted human-health risk assessments. Received three letters of commendation for work performed under this contract.

Project Scientist, Grand Calumet River Natural Resources Damage Assessment Litigation Support, Grand Calumet River Potential Liable Party Work Group, Gary IN. Designed technical studies to assess damage to natural resources in the Grand Calumet River. Calculated current and historical loads of chemical contaminants from point sources and provided guidance on modeling nonpoint source loads.

Principal In Charge, Assessment of Remedial Actions at Petroleum Spill Site, Perkins Coie LLP, Togiak, AK. Reviewed past and future proposed remedial actions at a coastal facility in Togiak and provided a critique on the effectiveness of past site efforts and recommendations of future activities. Represented the client in negotiations with their insurance carrier and the Alaska Department of Environmental Conservation.

Principal In Charge, Dioxin Fate and Transport Assessment, City of St. Helens and Boise Cascade, Inc., St. Helens, OR. Measured dioxin and furan congeners in sediment and crayfish upstream and downstream of an outfall jointly used by the City of St. Helens and Boise Cascade. A fingerprinting analysis demonstrated that the sources of dioxins accumulating downstream of the outfall must include sources in addition to the outfall. Received letter of commendation from client.

Principal In Charge, Truck Manufacturing Plant, Remedial Investigation, Stoel Rives, LLP, Portland, OR. Provided technical and strategic support to evaluate contaminant transport via groundwater and stormwater into the Willamette River and the feasibility of developing a sediment cap as a remedial option.

Risk Assessment Lead, Humboldt Bay Power Generating Facility Voluntary Cleanup Actions, Resolute Management, Inc., Humboldt County, CA. Assisted in developing the study design for a work plan to fill existing data gaps on chemical fate and transport on site to evaluate both terrestrial and marine impacts. Completed a statistical analysis of existing data to develop site-specific metal background concentrations for lowland soils and groundwater. Data was screened against background values and other toxicity benchmark values to identify areas impacted by past facility operations.

Project Manager, Lake Chelan DDT Food Web Model Development, Chelan County Natural Resource Department, Chelan, WA. Developed a food web model based on the Gobas model to evaluate DDT cycling within Lake Chelan. The model was used to support management decisions for remedial options as part of post TMDL implementation planning. The model examined DDT exposure from sediments, porewater, water column and diet for eight species of fish and several zooplankton and zoobenthos species.

Principal In Charge, Assessment of Landfill and Sediment Contamination, Washington State Attorney General, Bellingham Bay, WA. Provided technical and litigation support to the Attorney General's Office for an assessment of contaminant transport from Cornwall landfill to Bellingham Bay in Puget Sound.

Principal In Charge, Development of Human and Ecological Risk-Based Soil Cleanup Levels for Abandoned Mine Sites, U.S. Forest Service, ID. Developed risk-based soil/sediment cleanup levels for common metal contaminants at abandoned mine sites based on several recreational use scenarios that considered dermal, inhalation, and ingestion exposure.

Publications and Presentations

- "Comparison of Semipermeable Membrane Device (SPMD) and Large-Volume Solid-Phase Extraction Techniques to Measure Water Concentrations of 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD in Lake Chelan, Washington." S.G. Ellis, K. Booij, and M. Kaputa. Chemosphere. 72(8):1112-1117. 2008.
- "Polychlorinated Biphenyls in Four Freshwater Fish Species from the Willamette River, Oregon: Analysis of 209 PCB Congeners and Aroclor Mixtures." S.G. Ellis, Proceedings of the National Forum on Contaminants in Fish. Research Triangle Institute, Triangle Park, NC. May 6 and 9, 2001.
- "Developing Biological Indicators in the Lower Columbia River Basin." S.G. Ellis, Lower Columbia River Estuary Program Biological Integrity Workshop, Sandy, Oregon. May 13-14, 1999. Oregon Sea Grant Publication ORESU-W-99-002.
- "Characterizing Fish Assemblages in the Willamette River, Oregon, using Three Different Bioassessment Techniques." S.G. Ellis, S.T. Deshler, and R. Miller. River Quality, Dynamics and Restoration. CRC Press, Inc. A. Laenen and D.A. Dunnette, editors. 1997.
- "The Lower Columbia River Bi-State Program 1991 Reconnaissance Survey." S.G. Ellis, and C.L. DeGasperi. Lake and Reservoir Management. 9(1):172-178. 1994.
- "Comparison of gut-evacuation rates of feeding and non-feeding Calanus marshallae." S.G. Ellis, and L.F. Small. Marine Biology. 103(2): 175-181. 1989.
- "Use Attainability Analysis - National Perspective." S.G. Ellis. Idaho Department of Environmental Quality Use Attainability Workshop. Invited speaker to provide a national overview of how states are conducting UAAs, Boise, ID. November 30 - December 1, 2004.
- "Lower Columbia River and Estuary Research Needs Identification Workshop." S.G. Ellis. Invited expert to serve on a six-member panel to provide recommendations to the Portland District Army Corps of Engineers and the Lower Columbia River Estuary Partnership for future strategies and approaches for restoring salmonid habitat in the Columbia River, Portland, OR. March 24-25, 2003.
- "Habitat Conservation and Restoration Projects in the Lower Columbia River and Estuary Workshop." S.G. Ellis. Invited expert to provide technical advice to the Portland District Army Corps of Engineers on Developing Criteria for Selecting Potential Salmon Restoration Sites in the Columbia River, Astoria, OR. June 12-13, 2001.
- "Developing Biological Indicators in the Lower Columbia River Basin." S.G. Ellis. Lower Columbia River Estuary Program Biological Integrity Workshop. Sandy, Oregon. May 13-14, 1999. Oregon Sea Grant Publication ORESU-W-99-002. Invited speaker to present approaches being used to develop biological indices to assess impacts to aquatic biota within the Columbia and Willamette rivers. 1999.
- "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories." S.G. Ellis. U.S. Environmental Protection Agency, Fish Sampling and Analysis. Second Edition. Washington, D.C.: USEPA Office of Water, EPA 823-R-95-007, v. 1. 1995.

Laura Stirban, PG – Remedial Investigation Lead	YEARS EXPERIENCE	
	Total 22	Yrs. with Firm 11
Education: BS, Geological Engineering	**Registration/Certification:** Licensed Professional Geologist, IN	

Why Selected:

- Project Manager on 3 sediment projects in USEPA Region 5
- Diverse experience in various types of sediment investigation approaches

Sample Experience:

Investigation Lead, Ohio River Sediment RI/FS/RD/RA, Ironton Tar Plant Superfund Site – Ohio River, Ironton, OH — Ms. Stirban provided technical RI/FS leadership for the Tar Plant operable unit of this superfund site. Following a comprehensive remedial investigation, including characterization of soil, DNAPL, groundwater, sediment, surface water, ambient air and soil vapor a Risk Assessment was completed to identify potential exposure risks. Adaptive sediment sampling techniques were implemented to improve delineation. A feasibility study was completed to evaluate remedial alternatives and following considerable interaction with state and federal regulators a favorable remedy was negotiated that allows leaving soil contamination in place and capping. The selected sediment remedy, as memorialized in the Record of Decision, specifies upstream concentrations as the cleanup criteria (rather than theoretical risk-based criteria) and allows a flexible combination of in situ capping and dredging. AMEC calculated the equilibrium sediment partitioning benchmark toxic unit (ESBTUs) and Equilibrium Pore Water Toxic Unit (EPWTU) and established background concentrations for the PAHs in sediment. Upstream sediment ESBTUs were used as the sediment PRGs. Extent of sediment remedy was ultimately based on EPWTUs. Engineering design is nearly complete to address streambank and sediment bed restoration over approximately 6 acres along the Ohio River and to implement capping remedy.

Investigation Lead, Lower Rouge River–Old Channel, Remedial Investigation/ Feasibility Study, Detroit MI—Provided technical support for development of RI/FS SOW attached to Project Agreement and approved by GLNPO. Scope of work includes sediment and porewater sampling, hydrographic surveys, and use of innovative characterization technologies to identify possible upland sources *(TarGost®)* and potential in river sources *(UVOST®).* In support of SOW development, managed and reviewed results from historic property uses to identify possible sources and specify sample locations and approaches. Work collaboratively with USEPA and USEPA's consultant to complete the RI and managed completion of the FS by a large team with various technical skills and expertise.

Investigation Lead, Remedial Investigation, Detroit River, Detroit, MI—Responsible for technical support for former Detroit Coke site on the Detroit River. An interim groundwater collection system was installed at this 120 acre site to prevent discharge of contaminated groundwater to the Rouge River and Detroit River and a comprehensive remedial investigation has been completed. Through a comprehensive data collection and evaluation, the RI identified other PRP for the site contamination. The Remedial Action Plan is being currently developed with focus on the site-related contamination. The sediments in the Detroit River were also being investigated using innovative technical approaches, including pore water studies to evaluate potential contaminant bio-availability.

Jerry Eykholt – Feasibility Study / ASTM Lead	YEARS EXPERIENCE	
	Total 21	Yrs. with Firm 2
Education: BS, MS, and PhD in Civil and Environmental Engineering	**Registration/Certification:** Professional Engineer - Environmental, WI, MI, MN, OH, FL	

Why Selected:

- PhD/PE environmental engineer
- 20+ years feasibility experience related to contaminated sediment projects
- Broad skill set in environmental modeling and statistical methods:
    - Contaminated sediments (Tecplot, GIS, SGeMS, IgorPro)
    - Watershed and hydrological modeling (WinHSPF, HYDRUS-2D)
    - Groundwater flow and contaminant transport (GMS, MODFLOW, MT3D)

Sample Experience:

Senior Engineer, Detroit River, Detroit, MI—Responsible for preparing work plan for sediment investigation, potential follow-up investigation, and RI/FS for this 35-acre site impacted by PAHs and other compounds. Encouraged lower-cost vibracore and ponar sampling, and selecting a sampling team experienced in achieving high-quality samples in deep water with stronger currents. Used adaptive sampling techniques to improve delineation. Currently developing delineation model to use multiple lines of evidence approach for a probable capping remedy.

Senior Engineer, Lower Rouge River–Old Channel RI/FS, Detroit MI—Responsible for technical analysis, review, and preparing the RI and FS for this Great Lakes Legacy Act project. The Old Channel is a highly developed, 1 ½ mile, narrow and steep-banked navigational channel with challenging factors for remediation. Sediments are impacted by PAHs. Dr. Eykholt is involved in technical project discussions, works collaboratively with a large team of consultants from four consulting companies, and provides site data integration, 2D and 3D modeling of channel features, and 3D contaminant delineation using a multiple lines of evidence approach. Currently completing FS and developing plans for pre-design sampling and remedial design.

Senior Engineer, Callahan Mine Superfund Site, Brooksville, ME —Responsible for pre-design work plan and analysis of mine tailings-impacted sediment and mine waste rock management for this abandoned iron mine along the central coast of Maine. Project for the Maine Department of Transportation involves potential confined aquatic disposal (CAD) in a former mine pit, currently submerged beneath a sensitive coastal estuary. A heat and mass transfer model for the fate of contaminants in the CAD will be developed, and integrated with a surface mixing model that has been developed by Wood's Hole Group.

Senior Engineer, Ohio River Sediment RI/FS/RD/RA, Ironton Tar Plant Superfund Site – Ohio River, Ironton, OH—Assisted planning for sampling and developed 2D and 3D delineation models of this 7-acre sediment site impacted by PAHs. Practical evaluation methods and multiple lines of evidence approach led to a sediment capping remedy that was readily accepted by regulators and essentially decoupled from the upland site. Selected remedy avoids great difficulties, such as high risks of slope failure, NAPL release, and other problems that would be associated with dredging at the site. Assisting and providing review on the remedial design.

Principal Engineer, RI/FS, Buffalo Color Site, Buffalo, NY—Reviewer of FS sections to address river sediments contaminated with PAHs and mercury.

Lead Environmental Engineer, Lower Fox River OU2-5 Project, Appleton to Green Bay, WI— Provided reviews, cost analyses, sampling plans, and other critical work products for multiple clients from the Fox River Group, as a critical member of the sediments team since 2001. Time-critical analysis of sediment geotechnical characteristics, hydrodynamic evaluations, and geostatistical modeling results of PCB contamination led to accurate predictions of limited sand quantities, dewatering characteristics, cap consolidation, dewatered sediment load-out, better project contract specifications, and testing protocols for this multi-year, nationally recognized sediments project.

Lead Environmental Engineer, Lower Fox River OU1 Project, Menasha/Neenah, WI— Technical lead and strategic consulting on this project. Dr. Eykholt led the development of sampling plans, 3D delineation modeling approach, 3D mesh post-processing tools, GIS data integration, dynamic dewatering and process calculations for environmental dredging, TSCA evaluations, integration of wind/wave and other hydrodynamic bed shear estimates, and cap design for this $100 million project. His work on cap design included erosion evaluations, filter layer specifications, chemical isolation layer modeling, consolidation modeling, mixing layer evaluations, and pilot-scale test planning and evaluations. He also provided key information to the dredge and cap placement contractor in a way that allowed optimization of construction practices. The work also provided quantitative post-remedial action reviews that allowed time-critical optimization of surface weighted average PCB concentrations (SWAC). The modeling and GIS methods were highly successful as a platform for enhancing client, agency, and oversight team discussions on alternative remedies. The work led to optimal remedy selection and high-quality dredge, cover, and cap designs. The OU1 Optimized Remedy was nominated for a national engineering award.

Lead Environmental Engineer, Calumet Sag Channel, Chicago, IL— Dr. Eykholt was a technical lead on this project for the US Army Corps of Engineers. He led sampling and sediment testing plans, dewatering and flocculant testing, and provided a detailed technical summary of sediment physical characteristics, total concentrations, and dredge modified elutriate testing results.

Lead Environmental Engineer, Renard Island, Green Bay, WI— Dr. Eykholt performed a time-critical contaminant flux analysis that considered seiche and seepage-related mass transfer mechanisms for this confined disposal facility (CDF) managed by the Green Bay Port Authority. With other technical analysis of the CDF and strategic consulting, the work led to agency approval of a low-cost closure plan for the CDF.

Lead Environmental Engineer, Humboldt Mill Mine Permit, near Marquette, MI— Dr. Eykholt co-developed a complex, multi-compartment heat and mass transfer balance model for the dynamic evaluation of a mine pit lake and subaqueous placement of mine tailings. The work led to an agency-approved mine permit from the State of Michigan, allowing an $80 million restoration of the mill, another mine project to avoid on-site processing of massive-sulfide ore, and the development of practical loading and monitoring requirements for mine operations. Dr. Eykholt was also the engineer of record for the mine permit application.

Appendix II

SUBCONTRACTOR/SUPPLIER (for Mods only): Point of Contact:	**REQUISITION No.** **95422**	**Date Created**
	SUBCONTRACT/PO No. (for Mods)	**Mod No.**

PRIME CONTRACT NO. & CLIENT NAME (N/A FOR OVHD)	**REQUESTOR** (Point of Contact for Procurement)

COMPETITIVE? ☐ YES ☐ NO	**PROJECT EXPENSE ACCT**(Project/Phase/Task/Dept)	**PERIOD OF PERFORMANCE/DELIVERY DATE**

☐ **CHECK THIS BOX IF THIS PR IS TO BE USED TO OBTAIN PRICING FOR PROPOSAL PURPOSES ONLY AND AWARD IS NOT AUTHORIZED. ADDITIONAL APPROVALS MAY BE REQUIRED PRIOR TO AWARD.**

LIST ITEMS/SERVICES TO BE PROCURED AND ATTACH ADDITIONAL DOCUMENTATION AS NEEDED (SOLICITATION LIST OR SOURCE JUSTIFICATION, RFP CHECKLIST, BUDGET ESTIMATE, ETC.)

ITEM	*DESCRIPTION*	*UNIT*	*QTY*	*UNIT PRICE*	*LINE TOTAL*
				TOTAL	

APPROVAL	PRINTED NAME AND SIGNATURE	DATE OF APPROVAL
PROJECT/UNIT MANAGER		
OWNING GM/VP/SVP		
EVP/PRESIDENT		

WORK AUTHORIZATION FOR PROCUREMENT LABOR
(NOTE: Budget covers solicitation, award, administration, invoice processing and closeout)

HOURS BUDGETED FOR THIS PROCUREMENT:	PROJECT #	PHASE	TASK	DEPARTMENT

FOR SUBCONTRACTS/PROCUREMENT USE

NAICS CODE	SIZE STD	DPAS RATING	RFP/RFQ NO.	PROCUREMENT REP.	DATE RECEIVED

Rev. 3/07

Appendix III

Document Control
Rev. 2, March 25, 2013

1.0 PURPOSE

This procedure establishes the responsibilities and the methods for controlling the preparation, review, approval, distribution, revision, and cancellation of AMEC Environment & Infrastructure (AMEC) Quality Assurance (QA) Program controlling documents.

2.0 SCOPE

This procedure applies to AMEC personnel who process or utilize QA Program controlling documents.

3. 0 DEFINITIONS

CONTROLLING DOCUMENT - A document such as a drawing, procedure, or specification that defines the requirements or the method for performing activities affecting the quality of products and services.

4.0 RESPONSIBILITIES

4.1 Document approving authorities are responsible for designating respective Document Administrators.

4.2 Document Administrators are responsible for the following:

- Maintaining document master indices and assigning numbers and revision levels to applicable documents
- Tracking the status of applicable documents
- When applicable, updating and reissuing Tables of Contents
- Developing and maintaining distribution lists for applicable documents
- Ensuring reproduction, distribution, and control of applicable documents

4.3 Recipients of controlling documents are responsible for maintaining applicable documents in accordance with the requirements of this procedure.

5.0 PROCEDURE

5.1 Document Administrators maintain master lists of applicable controlling documents that include document number, title, revision status, and approving authority. Document numbers are developed and assigned in accordance with applicable procedures. Canceled numbers are not reassigned.

5.2 Controlling documents are prepared, reviewed for adequacy, approved for issue, revised, and canceled in accordance with applicable procedures.

<u>Table of Contents</u>

5.3 When documents are issued as a part of a manual, or when a single document is issued in discrete sections, a Table of Contents is developed for each such manual or document. The

Table of Contents identifies the document number, title, revision, and date of each document in the manual or section in the document. The Table of Contents is updated and reissued each time a related document is revised.

If a document is canceled, the number and title is retained in the Table of Contents with the word "CANCELLED" in parentheses following the title.

5.4 The Table of Contents carries its own revision status that is incremented each time it is revised. The revision status of the Table of Contents represents the revision status of the total manual or document.

Issue Control

5.5 Document Administrators, with appropriate management, develop and maintain a distribution list for each controlling document. A unique control number for each document is assigned to each recipient.

5.6 Upon receipt of the approved document from the approving authority, the Procedure Administrator obtains reproduction and performs distribution of the document in accordance with the established controlled distribution list. A return receipt acknowledgment, similar to Attachment 1, is required.

5.7 Each recipient verifies that the material received is in accordance with the transmittal. New material is appropriately filed. Superseded or obsolete material is destroyed or clearly identified as superseded, to preclude inadvertent use.

5.8 The recipient signs the receipt acknowledgment and returns it to the procedure administrator in accordance with the instructions in the transmittal. If the receipt is not returned, the document is subject to recall.

5.9 When a recipient no longer has need for a controlled document, the document is returned to the Document Administrator and the individual's name is removed from the distribution list.

6.0 RECORDS

6.1 A copy of each document, revision, and applicable Table of Contents is retained as a permanent record.

6.2 The Procedure Administrator retains receipt acknowledgments for the current revision of controlling documents.

7.0 REFERENCES

AMEC Quality Assurance Plan, Section 8.0

8.0 ATTACHMENTS

TYPICAL DOCUMENT TRANSMITTAL/RECEIPT

TO: ***[Document Recipient]***

FROM: ***[Applicable Document Administrator***

DATE:

SUBJECT: **Document Transmittal/Acknowledgment**

Attached is *[identify document and revision]* and a revised Table of Contents *(if applicable).* Please replace the existing Table of Contents and *(add or replace, as applicable)* documents with the new material. Superseded documents are to be destroyed or clearly marked as superseded to prevent inadvertent use.

Please acknowledge receipt of the new material and signify destruction or appropriate identification of superseded material by signing and dating below. Retain a copy of this acknowledgment and return the original to:

[Name and address of applicable Document Administrator]

Controlled Copy No. ___________________________

Assigned to: _________________________________

Signature: ___________________________________

Date Received: ______________________________